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ABSTRACT

Field testing of the Time with the Clock Unit of the Money, Measurement and Time Program was conducted with 23 elementary school classes of educable mentally handicapped (EMH) children. The 227 Ss were assigned to the experimental group, the Hawthorne group, or the control group. A criterion referenced test was administered to Ss to evaluate vocabulary and skills developed in the three books of instruction. Testing demonstrated that the unit significantly increased the EMH child's knowledge of time skills and vocabulary. Analyses of community location effects indicated that the unit was highly effective in rural and suburban communities, as well as in urban areas. Teachers who completed evaluations indicated a preference for the unit over other instructional materials. (GW)

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# SUMMATIVE EVALUATION OF THE TIME WITH THE CLOCK UNIT OF THE MONEY, MEASUREMENT AND TIME PROGRAM[1]

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The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

# Summative Evaluation of the Time with the Clock Unit of the Money, Measurement and Time Program[1]

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In an attempt to further delimit Cronbach's (1963) definition of evaluation as "the collection and use of information to make decisions about an educational program," Scriven (1967) has distinguished between "formative" and "summative" evaluations. Formative evaluation occurs during the development of an instructional product, and its purpose is to identify strengths and weaknesses so that the product can be revised as it is being developed. Summative evaluation occurs when the "final" instructional product is in a field-test situation. Its purpose is to assess the effectiveness of the porduct in the classroom.

Over the past two years instructional materials produced by the Vocabulary Development Project of the University of Minnesota's Research, Development and Demonstration Center have been subjected to both formative and summative evaluations. The materials, referred to as the Money, Measurement and Time Program, were developed for educable mentally retarded (EMR) children. As each unit in the Program was being developed, it underwent an extensive formative evaluation process (cf., Krus, Thurlow, Turnure, Taylor, & Howe, 1974). Revisions of all units were made on the basis of the feedback from the formative evaluations in order to prepare them for use in a large scale field-test. The summative evaluation of the units occurred during this field-test.

The present paper is a description of the summative evaluation of the Time with the Clock Unit, one of the five units in the Money, Measurement and Time Program. Formative evaluation of the Time with the Clock Unit took place over a period of one year, and produced a revised unit which seemed to be extremely effective for EMR children (Krus, Thurlow, Howe, Taylor, & Turnure, 1974). The purpose of the summative evaluation of the Time with the Clock Unit was to test the effectiveness of the revised unit and its useability in the classroom when interactions between Project personnel and field-test participants were minimal.

The Money, Measurement and Time Program

The Money, Measurement and Time Program (Thurlow, Taylor, & Turnure, 1973) is an instructional program designed for young educationally handicapped learners. The Program includes five units: 1) Money, 2) Measurement of Length, 3) Measurement of Weight, 4) Time with the Clock, and 5) Time with the Calendar. Systematic instruction is provided in these areas without requiring that the children have reading or computational skills. Further information about the specific instructional units in the Program is available in the Teacher's Introduction to the Program (Thurlow, Taylor & Turnure, 1973).

The Money, Measurement and Time Program was developed from basic learning strategies research, such as research on mental imagery and verbal elaboration. It represents one of the first

attempts to translate these recently developed areas of experimental research into an instructional program for EMR children.

The general aims of the Money, Measurement and Time Program were to develop vocabulary and related skills, and furthermore, to enhance general language development and the development of effective learning strategies. Several specific goals of the Program included: 1) an improved understanding of the critical vocabulary, and thereby better understanding of the general area of instruction (money, measurement, or time), 2) the development of beginning skills in the particular area of instruction, with an emphasis on use of these skills in everyday situations, 3) an increase in general language development, especially expressive communication, and 4) the use of more efficient learning and memory strategies which could apply to other areas of instruction.

Time with the Clock Unit

The Time with the Clock Unit, like the other units in the Program, was developed jointly by educational practitioners and educational researchers. During the process of development, a needs assessment was conducted by searching available curriculum materials for teaching time concepts. During this search, special empnasis was placed on determining the availability of materials for educationally handicapped children. It was found that the materials available for teaching time were geared primarily for children of normal intelligence, or for children with entry level skills (e.g., reading and/or counting skills) exceeding those of

most EMR children of elementary school age. Based upon the evident need for instruction for EMR children, the specific time-related needs of these children were assessed and organized into an instructional package consistent with a verbal elaboration-based instructional approach found to be successful with EMR children (Taylor, Thurlow, & Turnure, 1974).

Initially, the Time with the Clock Unit was produced in a pilot-test form which was subjected to extensive formative evaluation and revision (Krus, Thurlow, Howe, Taylor, & Turnure, 1974). Through the development of both vocabulary and skills, the revised Time with the Clock Unit attempts to provide EMR children with an understanding of certain time concepts related to the clock. It is this revised version that was employed in the field-test and subjected to summative evaluation.

The field-test version of the Time with the Clock Unit included four books of instruction. The instruction begins by introducing basic time terms (day, night, etc.) and the need for being able to tell time, and proceeds to instruction related to telling time to the hour, the half hour, and finally, the minute.

The instructional content of the four books of the Time with the Clock Unit was written to stress the gradual and closely structured development of both time vocabulary and time-telling skills. The four books in the Time with the Clock Unit represent progressive levels of instruction, from the lowest to the most advanced. Depending upon the ability of the children, a book of

instruction might take from one week to several months to complete. Children may begin instruction at various points depending on their beginning skills. Individually administered assessment instruments are provided for initial diagnostic placement and for determining final achievement.

The instructional materials in the Time with the Clock Unit included teacher's editions (four books), cassette tapes containing definitions and stories related to important time concepts, books of pictures for the children to follow as the tape was presented, and numerous worksheets and transparencies to complete the instruction. Each book of instruction is composed of lessons that contain instruction related to one or more vocabulary words. Each lesson is associated with specific purposes and behavioral objectives. The lessons within a book are carefully ordered, with behavioral objectives in one lesson being requisite for adequate performance in later lessons. A lesson, which usually requires several periods of instruction, includes three major components: 1) pre-activities which introduce the concepts or review the meaning of necessary prerequisite concepts, 2) tape presentations which develop the meaning of vocabulary words and the relations between words, and 3) post-activities which review and reinforce the concepts and relations established in the tape presentation.

The Summative Evaluation Plan

The desired field-test plan, in which classes would be allowed to spend at least one year progressing through the instruction in

the Time with the Clock Unit, could not be implemented due to budget and time restrictions. Instead, the field-test of the Time with the Clock Unit was carried out in conjunction with the field-test of the Money Unit. Thus, except for a few classes, instruction in the Time Unit was started after the children had received from three to four months of instruction in the Money Unit. Instruction in the Time Unit for all classes (including the "exceptions" which did not receive the Money Unit) was presented for a period of four to six weeks. A similar plan was used to test the Measurement of Length and Measurement of Weight Units.

Design

A two factor design (Treatment X Community) was employed in the summative evaluation of the Time with the Clock Unit. The major factor of interest was the instructional treatment factor. The three treatment groups in the present design were: 1) Experimental, 2) Hawthorne, and 3) Control.

The Experimental treatment group included those classes receiving the Time with the Clock instructional program. These classes did not receive any supplemental instruction on time concepts.

The Hawthorne treatment group consisted of classes receiving instruction in the Measurement of Weight Unit from the Money, Measurement and Time Program. The Hawthorne group was included

in the design as one type of control. Gains on the Time Test by this group would represent changes in performance one could expect from the "novelty" of a new program in the classroom, interactions with testers, "learning to learn," and several other factors. To conclude that the Time with the Clock instruction itself contributed significantly to performance increases, one must discover that Experimental group performed significantly better than the Hawthorne control group.

The Control treatment group consisted of classes where teachers were left on their own, either to teach or to not teach time concepts. When these teachers chose to teach time, they were allowed to use any materials available to them (e.g., published materials, teacher-developed materials, etc.), but they were not allowed to use the Time with the Clock Unit from the Money, Measurement and Time Program.

The second factor in the design was that of community location (urban, rural, or suburban). The categorization of communities as urban, rural, or suburban concurred with the categorization scheme of the Minnesota Department of Education. Urban communities included three of the four major cities in Minnesota. Suburban communities were ones which immediately adjoined these cities. Rural communities included those not covered by the above classification systems. It should be noted that these "rural" communities were somewhat unique and different from the usual conception of the word. For instance, one rural community contained two small

colleges, another contained one. Also, academic and professional people lived in some of the "rural" communities and commuted daily to work in a nearby urban community.

Subjects

The population employed for field-testing during the summative evaluation was elementary school-aged educable mentally retarded children. Of the 23 classes employed during the field-test of the Time with the Clock Unit, eight classes (4 urban, 3 rural, 1 suburban) were chosen to be in the Experimental treatment (i.e., they received instruction in the Time with the Clock Unit), seven classes (3 urban, 2 rural, 2 suburban) were included in the Hawthorne control treatment (i.e., they received instruction in the Measurement of Weight Unit), and eight classes (3 urban, 2 rural, 3 suburban) were included in the Control treatment (i.e., they received instruction from any source other than the Time with the Clock Unit, if the teacher chose to give it to them). Assignment of the classes to the treatment was predetermined by the fact that children receiving the Time with the Clock Unit were ones who had received the Money Unit, and children in the Hawthorne group were ones who had previously received the Measurement of Length Unit. The three classes added to the Experimental treatment group at the beginning of this field-test (i.e., the classes which had not received the Money Unit) were generally chosen to be younger and of a lower level of functioning

since the summative evaluation of the Money Unit revealed that the Experimental group children were of a somewhat higher level of functioning than the children in the Hawthorne group (Krus, Thurlow, Tumure, & Taylor, 1974).

Overall, there were 79 children (38 urban, 31 rural, 10 suburban) in the Experimental group, 66 (31 urban, 15 rural, 20 suburban) in the Hawthorne group, and 82 (28 urban, 23 rural, 31 suburban) in the Control group. It should be noted, however, that the specific numbers of children for whom data from specific tests were available varied due to scheduling problems and absenteeism.

A summary of the children's IQs, mental ages (MAs) and chronological ages (CAs) in the three treatment groups is presented in Table 1, along with the results of a one-way factorial analysis on each measure. Again, it should be noted that the number of subjects sometimes varied with the measure due to incomplete test data. Clearly, the three groups did differ significantly on IQ level and CA. A Newman-Keuls test for differences between the IQ means indicated that the Control group had a significantly higher IQ than the Hawthorne group ($p < .01$) and that the Control group had a significantly higher IQ than the Experimental group ($p < .05$). The Experimental and Hawthorne groups did not differ significantly on IQ. A Newman-Keuls test on the GA means revealed

Table 1

Comparisons Between the Three Treatment Groups on IQ, MA, and CA

| | Experimental | Hawthorne | Control | F |
|---|---|---|---|---|
| IQ | | | | |
| $\bar{X}$ | 70.6 | 68.3 | 74.2 | 7.04 |
| SD | 8.5 | 10.1 | 9.3 | ($p < .001$) |
| Range | 49-85 | 47-89 | 56-88 | |
| n | 67 | 62 | 73 | |
| MA (months) | | | | |
| $\bar{X}$ | 73.3 | 75.7 | 76.5 | <1 |
| SD | 13.2 | 13.8 | 14.8 | (ns) |
| Range | 44-98 | 50-114 | 50-118 | |
| n | 66 | 61 | 73 | |
| CA (months) | | | | |
| $\bar{X}$ | 101.0 | 110.8 | 102.1 | 5.81 |
| SD | 17.2 | 19.9 | 18.8 | ($p < .01$) |
| Range | 73-136 | 63-145 | 74-142 | |
| n | 79 | 66 | 82 | |

that the Hawthorne group was significantly older than both of the other groups (ps $<$ .01). No differences existed on the MA measure, the measure often viewed as most important in determining a relative level of functioning.

Table 2 presents the IQ, MA, and CA data arranged according to community location. One-way factorial analyses revealed a significant effect of community location for each measure. Newman-Keuls tests for differences indicated that children in the rural community had higher CAs and MAs than children in both the urban and suburban communities (ps $<$ .01), and higher IQs than the children in the urban community ($p < .01$). The suburban children also had higher IQs than the urban children (ps $<$ .01).

Tests

A criterion-referenced test was administered to the children to determine the effectiveness of the Time with the Clock Unit. The test was administered as a pretest, and at the same time, to determine the placement of a class within the sequence of instruction. The same test was administered as a posttest at the end of the year.

The Time Test was a thirty item test developed directly from the behavioral objectives of the lessons. It consisted of three subtests which corresponded to the vocabulary and skills developed in the three books of instruction. The test-retest reliability of the Time Test was .89. Its concurrent validity with the time items from the Key Math Diagnostic Arithmetic Test (Connolly, Nachtman, & Pritchett, 1971) was .84.

Table 2

Comparisons Between the Three Treatment Groups on IQ, MA, and CA

| | Urban | Rural | Suburban | |
|---|---|---|---|---|
| IQ | | | | |
| $\bar{X}$ | 67.22 | 72.61 | 74.91 | F |
| SD | 9.91 | 7.88 | 9.17 | 13.06 |
| Range | 47-89 | 49-88 | 56-93 | ($p < .001$) |
| n | 77 | 69 | 57 | |
| MA (months) | | | | |
| $\bar{X}$ | 71.93 | 83.19 | 69.88 | 20.73 |
| SD | 14.68 | 12.18 | 10.80 | |
| Range | 44-114 | 62-118 | 53-102 | ($p < .001$) |
| n | 74 | 69 | 57 | |
| CA (months) | | | | |
| $\bar{X}$ | 104.54 | 112.60 | 91.52 | 22.62 |
| SD | 20.52 | 20.10 | 12.17 | |
| Range | 63-148 | 81-143 | 75-121 | ($p < .001$) |
| n | 97 | 80 | 62 | |

A Cognitive Abilities Test (Thorndike, Hagen, & Lorge, 1968) was also administered to the children participating in the present field-test. Since this test was employed to evaluate the child's general improvement in non-content specific areas of cognitive functioning after a full year of instruction in the Money, Measurement and Time Program, the results of this test will not be described here.

Procedure

The field-test of the Time with the Clock Unit was conducted over a period of four to eight weeks. The goal of the field-test was to assess the Time with the Clock Unit under relatively "normal" classroom conditions, with minimal interaction between Project personnel and field-test participants.

Before instruction was started, children in each class were pretested on the Time Test (and new classes were tested on the Cognitive Abilities Test). Then, each teacher in the Experimental treatment group was given a written introduction to the Time with the Clock Unit (see Appendix 1), and those teachers who had not participated in the field-test of the Money Unit were also given a brief in-service training session to introduce them to the Money, Measurement and Time Program, and to familiarize them with the field-test plan. Interactions with the classes stopped at this point (except for "comment cards" returned to Project Directors when the teachers felt comments were necessary), until posttesting time.

After instruction ended, classes were posttested on the Time test and the Cognitive Abilities Test. At this point, teachers were requested to complete a detailed questionnaire on their reactions to the Unit, and to the Program in general. Control teachers were also asked to describe any instruction related to time that they had used during the same period.

## Results

During the summative evaluation of the Time with the Clock Unit, the major sources of effectiveness data were the results of the pretesting and posttesting. Only a limited number of the children participating in the field-test actually received both the pretest and the posttest due to absenteeism, school schedules, etc. In order to benefit from the larger number of children in the total sample, it was decided that all pretest data and all posttest data would be analyzed although the results from the pretest would include some children not posttested, and vice-versa. These results are presented in two sections: 1) Pretest comparisons, and 2) Posttest comparisons.

The next section included in the results presents the data of just those children who were both pretested and posttested on the Time Test. The pretest to posttest comparisons on these data, although based on a reduced sample size, are probably the most reliable for assessing the effectiveness of the Time with the Clock Unit.

Data related to the performances of the three treatment groups on individual items in the Time Test will also be presented. These

data not only provide further information on the effectiveness of the Unit, but also have the potential for identifying possible areas where revision of the instruction should be recommended.

The Results section will conclude with two additional sets of results. These results deal with: 1) Community location comparisons, and 2) Feedback from teacher evaluations.

Pretest Comparisons

In order to compare the posttest results of the three treatment groups (and so, assess the effectiveness of the Time Unit), pretest scores must first be compared to show that there were no differences between the three treatment groups on the Time Test before instruction. Table 3 presents the means and standard deviations of the pretest scores on the Time Test, and the results of a one-way analysis of variance on the scores.

The results of the analysis of variance indicate that there were no significant differences between the three treatment groups on the Time pretest. Thus, differences found between the Experimental groups and the other groups in posttest comparisons may be assumed to adequately reflect differences in performances resulting from the instruction.

Posttest Comparisons

The means and standard deviations of the posttest scores on the Time Test, and the results of a one-way analysis of variance, are also presented in Table 3. Follow-up analysis on the significant

Table 3

Comparison of Three Treatment Groups on Time Pretest and Posttest

| Time Pretest | Experimental | Hawthorne | Control | F |
|---|---|---|---|---|
| $\bar{X}$ | 12.57 | 13.12 | 14.86 | 1.92 |
| SD | 5.44 | 5.44 | 6.40 | (ns) |
| n | 72 | 34 | 36 | |

| Time Posttest | Experimental | Hawthorne | Control | F |
|---|---|---|---|---|
| $\bar{X}$ | 16.87 | 13.28 | 15.70 | 3.40 |
| SD | 6.36 | 5.44 | 6.50 | ($p<.05$) |
| n | 75 | 28 | 33 | |

treatment effect by means of a Newman-Keuls test indicated that the Experimental group scored significantly higher than the Hawthorne group ($p < .05$). The failure to find a significant difference between the Experimentals and Controls seemed to be due to the higher performance level of the control groups on the pretest, although the difference was not significant there. Clearly, both the Hawthorne and Control groups made relatively little improvement from pretest to posttest compared to the Experimental group.

Pretest to Posttest Comparisons

In order to avoid some of the limitations of analyzing all pretest and all posttest data separately, a procedure which does not recognize that all children were not both pretested and posttested, the scores of just those children receiving both tests were analyzed (see Table 4). These data are presented graphically in Figure 1. Repeated measures $t$ tests for each group indicated that only the Experimental group showed a significant increase in performance from the pretest to the posttest.

A two-way repeated measures analysis of variance revealed significant differences between pretests and posttests, and a significant treatment by test interaction (see Table 4). Tests of simple effects on the interaction indicated that at the pretest there was a significant difference between treatment groups, with the Control group performing better than the other two groups ($p < .001$). Significant differences also existed at the posttest, with the Experimentals and Controls performing better than the Hawthornes ($p < .001$). The crucial

Table 4

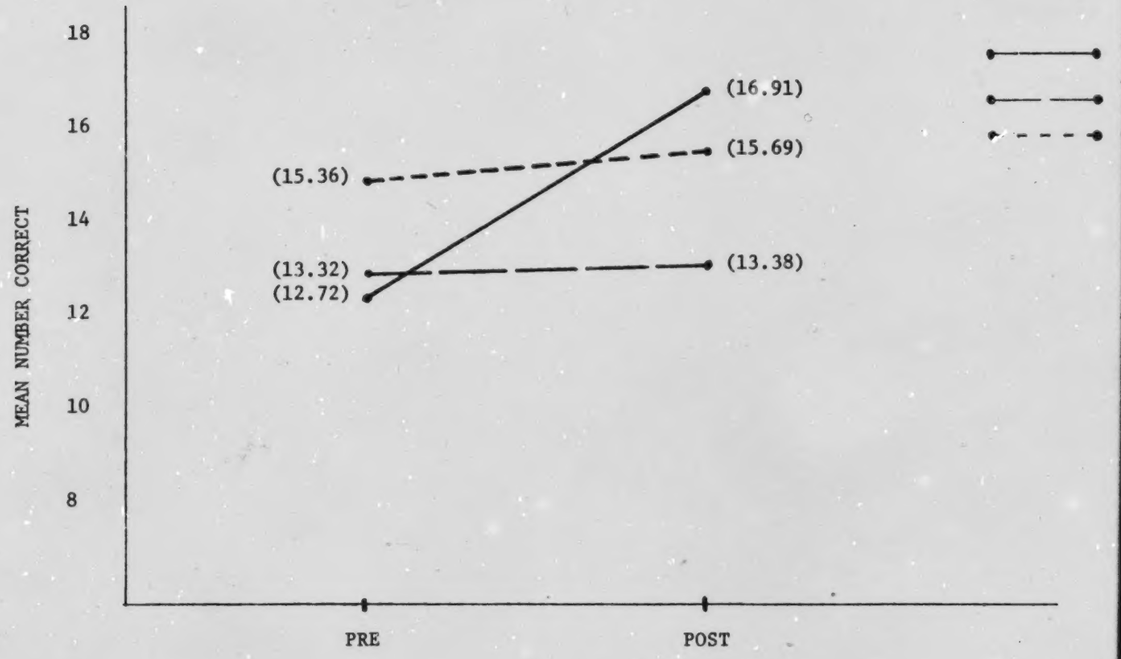
Pretest to Posttest Comparison of Subjects Receiving both Pre and Post Time Test

| | Experimental | | Hawthorne | | Control | |
|---|---|---|---|---|---|---|
| | Pre | Post | Pre | Post | Pre | Post |
| $\bar{X}$ | 12.72 | 16.91 | 13.32 | 13.28 | 15.36 | 15.69 |
| SD | 5.42 | 6.24 | 5.42 | 5.44 | 6.46 | 6.49 |
| n | 69 | 69 | 28 | 28 | 33 | 33 |
| | $t = 10.87$ ($p < .005$) | | $t < 1$ | | $t < 1$ | |

Two-way Repeated Measures ANOVA

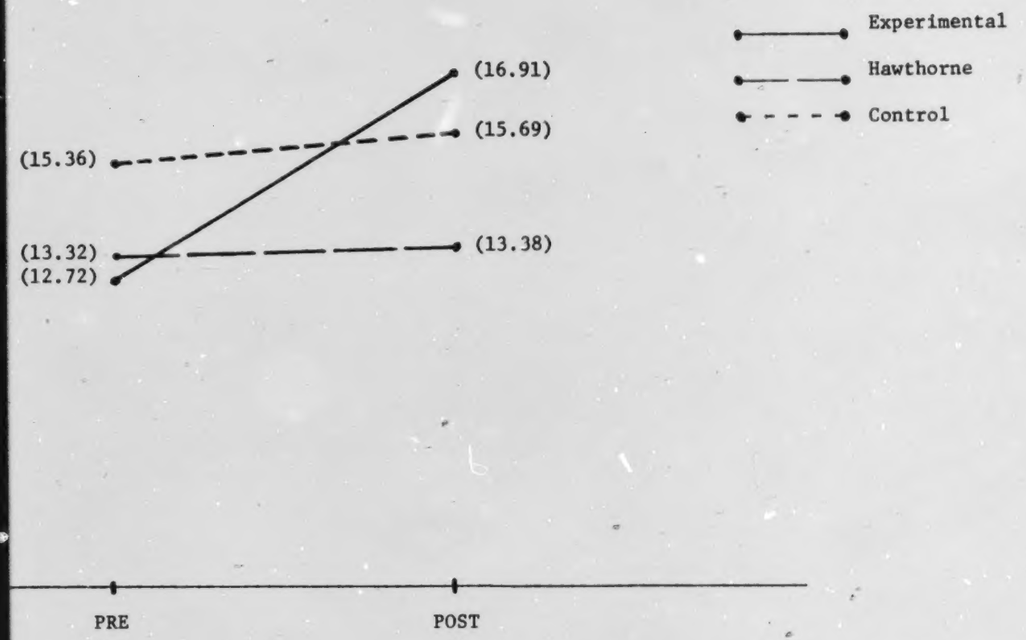
| Source of Variance | df | ms | F | |
|---|---|---|---|---|
| Between Ss | 129 | — | — | |
| Treatment | 2 | 78.23 | 1.19 | ns |
| Error | 127 | 65.81 | — | |
| Within Ss | 130 | — | — | |
| Tests (Pre, Post) | 1 | 343.85 | 75.40 | $p < .001$ |
| Treat. X Test | 2 | 131.60 | 28.86 | $p < .001$ |
| Error | 127 | 4.56 | — | |

Figure 1. Mean achievement level on the Time Skills pretest and posttest for each treatmen






chievement level on the Time Skills pretest and posttest for each treatment group



tests, those between pretest and posttest performances for each group, confirmed the findings of the repeated measures t tests: Only the Experimental group showed a significant improvement from pretest to posttest [$F(1,127) = 132.72$, $p < .001$; other $F$s < 1].

Item Analyses

The Time Test was a criterion referenced test, with items related directly to the behavioral objectives of the instruction. Table 5 presents this pretest and posttest per cent correct figures by test items for the Experimental treatment group on the Time Test. In this table, the items have been grouped by where instruction related to the items appears in the unit.

Observation of Table 5 indicates that for almost every item, the Experimental subgroups showed a marked increase from pretest to posttest performance when they had received the relevant instruction. Inspection of the items related to specific time telling skills (e.g., 015 - tells time on the hour; 018 - tells time to the half hour) reveals the quite outstanding gains made by the Experimental subjects receiving the instruction related to these objectives. Of those children receiving the instruction on telling time to the hour, 92% mastered the item on the posttest (compared to about 50% on the pretest). Seventy-six percent of those receiving the instruction mastered the half-hour item (compared to 20% at pretest).

Another interesting phenomenon is revealed by the inspection of Table 5. All four subgroups of Experimentals continued to make posttest gains on items that come directly after the last point at which

Table 5

Percent Experimentals Responding Correctly on Individual Items

by Where Instruction was Stopped

| | Overall | | Book 2, L 1 | | Book 2, End | | Book 3, L 1 | | Book 4, L4 | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Beginning to Book 2, Lesson 1** | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** |
| Labels dark | 90 | 95 | 62 | 78 | 100 | 95 | 91 | 100 | 90 | 92 |
| Labels night | 89 | 85 | 62 | 33 | 95 | 90 | 88 | 97 | 100 | 83 |
| Labels morning | 78 | 85 | 12 | 44 | 70 | 90 | 91 | 91 | 90 | 92 |
| Identifies afternoon | 39 | 43 | 12 | 11 | 40 | 45 | 35 | 44 | 70 | 58 |
| Identifies after | 61 | 73 | 25 | 44 | 50 | 70 | 68 | 79 | 90 | 83 |
| Identifies before | 62 | 75 | 12 | 44 | 55 | 70 | 70 | 79 | 90 | 92 |
| Identifies early | 74 | 67 | 0 | 22 | 80 | 80 | 79 | 65 | 100 | 83 |
| Identifies late | 50 | 62 | 12 | 44 | 55 | 55 | 56 | 65 | 50 | 67 |
| Identifies clock | 90 | 96 | 50 | 67 | 100 | 100 | 91 | 100 | 100 | 100 |
| Defines clock | 89 | 91 | 12 | 22 | 95 | 100 | 100 | 100 | 100 | 100 |
| Labels face | 15 | 80 | 0 | 22 | 20 | 100 | 15 | 79 | 20 | 92 |
| Labels hands | 62 | 92 | 12 | 56 | 60 | 100 | 76 | 97 | 60 | 92 |
| Labels numbers | 89 | 92 | 38 | 56 | 90 | 100 | 97 | 94 | 100 | 100 |
| | | | ENDED INSTRUCTION | | | | | | | |
| **Book 2, Lesson 1 to End of Book 2** | | | | | | | | | | |
| Defines hands | 54 | 72 | 0 | 11 | 50 | 60 | 62 | 88 | 80 | 92 |
| Defines o'clock | 42 | 64 | 0 | 0 | 30 | 65 | 59 | 74 | 40 | 83 |
| Tells time on hour | 46 | 85 | 0 | 33 | 45 | 100 | 59 | 85 | 40 | 100 |
| Demonstrates o'clock | 49 | 77 | 12 | 11 | 40 | 85 | 62 | 85 | 50 | 92 |
| Demonstrates movement of hands | 22 | 43 | 0 | 0 | 10 | 30 | 32 | 56 | 30 | 58 |
| | | | | | ENDED INSTRUCTION | | | | | |
| **Book 2 End to Book 3, Lesson 1** | | | | | | | | | | |
| Tells time to half hour | 15 | 51 | 0 | 0 | 5 | 15 | 26 | 76 | 10 | 75 |
| Demonstrates half hour | 18 | 52 | 0 | 0 | 5 | 10 | 32 | 85 | 10 | 67 |
| | | | | | | | ENDED INSTRUCTION | | | |
| **Book 3, Lesson 1 to Book 4, Lesson 4** | | | | | | | | | | |
| Identifies half hour | 31 | 44 | 0 | 0 | 10 | 20 | 50 | 68 | 30 | 50 |
| Counts by fives | 17 | 29 | 0 | 0 | 5 | 5 | 29 | 41 | 10 | 58 |
| Identifies minute hand | 42 | 55 | 0 | 0 | 50 | 45 | 50 | 55 | 30 | 83 |
| Defines half hour | 42 | 64 | 0 | 0 | 30 | 65 | 59 | 74 | 40 | 83 |
| Tells time 5 minutes after (2:20) | 10 | 12 | 0 | 0 | 5 | 0 | 18 | 15 | 0 | 33 |
| | | | | | | | | | ENDED INSTRUCTION | |
| **Book 4, Lesson 4 to End** | | | | | | | | | | |
| Tells time exact minute after (4:11) | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 8 |
| Demonstrates exact min. after (3:18) | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 17 |
| Tells time 5 min. before(3:45) | 4 | 13 | 0 | 0 | 0 | 0 | 3 | 24 | 0 | 17 |
| Tells time exact min. before (8 to 3) | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 17 |
| Demonstrates exact minutes before (9 to 5) | 4 | 5 | 0 | 0 | 0 | 0 | 3 | 9 | 0 | 8 |

instruction was received. Such findings imply that the instruction results in some generalized transfer, facilitation, or learning-to-learn effects. In other words, instruction on even part of the content of the Time with the Clock Unit resulted in the acquisition of additional objectives.

Table 6 presents the same breakdown of test items as Table 5, but identifies the percentages of Experimental, Hawthorne, and Control subjects responding correctly to each item. In addition, for the Experimental group, it distinguishes between the percentages of those who received the instruction and those who did not. For all items in the first grouping, the groups scored about the same. This might indicate that while teachers generally feel that EMR children need work on time comparatives and times of the day, the children in the present sample did not appear to need instruction in this area. Caution must be observed in recommending that such instruction be dropped, however, since the Hawthornes in the present sample were older, and the Controls had higher IQs. The instruction might, in fact, be most appropriate for lower level and younger children.

In the next grouping of items, the importance of the instruction in the Time with the Clock Unit becomes evident. Only about half or less of the Hawthorne subjects could answer any item correctly. The Control subjects did better than the Hawthornes, with slightly more than half of the Controls correctly answering each question. The Experimentals who received the instruction did far better than either group, with three-fourths or more of the Experimentals correctly answering each item. The same pattern of responding is evident in

Table 6

Per Cent Responding Correctly in Each Treatment Group on Individual Items

| | Experimentals Overall | Experimentals Receiving Instruction | Experimentals Not Receiving Instruction | Hawthorne | Control |
|---|---|---|---|---|---|
| **Beginning to Book 2, Lesson 1** | | | | | |
| Labels dark | 95 | 95 | - | 89 | 100 |
| Labels night | 85 | 85 | - | 93 | 88 |
| Labels morning | 85 | 85 | - | 78 | 88 |
| Identifies afternoon | 43 | 43 | - | 46 | 39 |
| Identifies after | 73 | 73 | - | 57 | 73 |
| Identifies before | 75 | 75 | - | 68 | 70 |
| Identifies early | 67 | 67 | - | 75 | 67 |
| Identifies late | 62 | 62 | - | 61 | 67 |
| Identifies clock | 96 | 96 | - | 96 | 100 |
| Defines clock | 91 | 91 | - | 89 | 94 |
| Labels face | 80 | 80 | - | 7 | 21 |
| Labels hands | 92 | 92 | - | 50 | 61 |
| Labels numbers | 92 | 92 | - | 100 | 100 |
| **Book 2, Lesson 1 to End of Book 2** | | | | | |
| | | (N=66) | (N=9) | | |
| Defines hands | 72 | 80 | 11 | 46 | 67 |
| Defines o'clock | 64 | 73 | 0 | 39 | 54 |
| Tells time on the hour | 85 | 92 | 33 | 64 | 79 |
| Demonstrates o'clock | 77 | 86 | 11 | 46 | 64 |
| Demonstrates movement of hands | 43 | 48 | 0 | 32 | 42 |
| **Book 2, End to Book 3, Lesson 1** | | | | | |
| | | (N=46) | (N=29) | | |
| Tells time to half hour | 51 | 76 | 10 | 25 | 48 |
| Demonstrates half hour | 52 | 80 | 7 | 4 | 36 |
| **Book 3, Lesson 1 to Book 4, Lesson 4** | | | | | |
| | | (N=12) | (N=63) | | |
| Identifies half hour | 44 | 50 | 43 | 25 | 48 |
| Counts by fives | 29 | 58 | 24 | 4 | 15 |
| Identifies minute hand | 55 | 83 | 49 | 61 | 42 |
| Defines half hour | 64 | 83 | 60 | 11 | 21 |
| Tells time 5 minutes after (2:20) | 12 | 33 | 8 | 7 | 18 |
| **Book 4, Lesson 4 to End** | | | | | |
| | | (N=0) | (N=75) | | |
| Tells time exactly (4:11) | 8 | - | 8 | 7 | 15 |
| Demonstrates exact minute after (3:18) | 7 | - | 7 | 4 | 15 |
| Tells time 5 minutes before (3:45) | 13 | - | 13 | 11 | 18 |
| Tells time exact minute before (8 to 3) | 5 | - | 5 | 4 | 9 |
| Demonstrates exact minutes before (9 to 5) | 5 | - | 5 | 4 | 9 |

the next two groups of items. That is, the Experimental subjects are more successful in learning to tell time than either of the other two groups. The Experimental subjects did not have sufficient time to complete the Time with the Clock Unit, and thus did not receive instruction on the last grouping of items. Here they respond at about the same level as the Hawthorne subjects, both groups doing less well than the Controls, who possibly received instruction in this area.

Community Location Comparisons

During the formative evaluation stage, the Time with the Clock Unit was written by teachers from an urban community and was pilot-tested with urban EMR children. To check the general effectiveness of the Time with the Clock Unit for different types of communities, comparisons of results by location were made.

Table 7 presents the posttest performance data from the Time Test, with the three treatment groups further defined in terms of community location. Results of the one-way analysis of variance carried out on each treatment group are also presented.

Generally, the rural children in every treatment scored higher than their suburban and urban counterparts. This difference was significant for both the Experimental and the Controls. These differences may be due to different ability levels of children placed in special classes in these communities, and very likely is related to the higher IQ found for the Control group. The Time with the Clock Unit appears to have been particularly efficacious for the suburban children. If it can be assumed that the scores of the Control and Hawthorne groups

Table 7

Comparisons of Posttest Data from the Time Test

for the Three Community Locations in each Treatment Group

| | Urban | Rural | Suburban | F |
|---|---|---|---|---|
| Experimental | | | | |
| $\bar{X}$ | 13.1 | 20.4 | 20.3 | 18.26 |
| SD | 5.6 | 4.9 | 4.7 | ($p < .001$) |
| n | 36 | 27 | 12 | |
| Hawthorne | | | | |
| $\bar{X}$ | 12.2 | 17.7 | 11.9 | 2.80 |
| SD | 3.8 | 7.6 | 5.0 | (ns) |
| n | 14 | 6 | 8 | |
| Control | | | | |
| $\bar{X}$ | 13.2 | 21.7 | 13.0 | 9.30 |
| SD | 3.4 | 8.0 | 3.6 | ($p < .001$) |
| n | 12 | 10 | 11 | |

are those that the Experimentals would have achieved without instruction, then the suburban Experimentals doubled their knowledge of time. There were no differences between the Experimental and Control children in the urban or rural communities.

Teacher Evaluation of the Time with the Clock Unit

Six of the Experimental group teachers answered a questionnaire about the Time with the Clock Unit. (See Appendix 2 for a copy of the questionnaire.) The number of years of teaching experience varied from one to 18 years, with a mean of 6.9 years (SD = 6.2). The number of years teaching EMR children ranged from zero to 18, with a mean of 6.1 years (SD = 6.3). Five of the six reporting teachers were certified in special education.

On the evaluation forms, the teachers indicated that the Time with the Clock Unit was taught each day of the week, and that about 20 minutes were spent preparing for each 25 minute teaching period. All of the teachers taught the Unit with the children in a semi-circle around them.

Seventy per cent of the teachers indicated that they enjoyed the Unit "very much"; none indicated that they would rather use something else to teach time. None of the teachers thought that teaching with the Time with the Clock Unit was boring. All of the teachers thought that most or all of the concepts covered in the Unit were important to children in the long run. All also thought that the children would remember the more important time concepts a year after learning them, and that the children were more interested in this instruction than

usual. Compared to other commercial materials they had used to teach time, the teachers rated the Time Unit as more useable, effective and enjoyable.

Other teacher reactions to the instruction and a summary of the data are available in Appendix 3.

## Summary

The summative evaluation of the Time with the Clock Unit described in the present paper served to document the effectiveness of the Unit for EMR children, and its useability in the classroom. Despite the fact that the field-test did not provide enough time for adequate progress through the instruction in the Time Unit, it demonstrated that the Unit did, in fact, significantly increase the EMR child's knowledge of time skills and vocabulary. This increase was greater than that obtained by either a Control group or a Hawthorne control group.

The effectiveness of the instruction in the Time with the Clock Unit was supported by the pretest and posttest gains, and by the performance levels on individual items.

Analyses of community location effects indicated that the Unit was highly effective in rural and suburban communities, as well as in the urban communities (the setting in which the materials were developed, pilot tested, and revised). The finding that the rural Controls performed significantly better than their urban and suburban counterparts suggested that these Control teachers might be engaging in special procedures or using special materials to teach time concepts to their children. When the Control teachers were asked to describe the time instruction they

had used, if any, all responded that they had taught time. All teachers indicated that they had used materials they had developed themselves in addition to some worksheets and manipulable materials from published curriculums. Five of the teachers gave an estimate of the total number of days they had spent on time instruction. The three suburban teachers averaged 11 days, and the one urban teacher indicated time was taught for 5 days (another urban teacher indicated that it was taught "daily"). The one rural teacher taught time for 32 days during the year (the other rural teacher indicated that instruction was given individually so that children spent "as much time as they needed" receiving time instruction).

The useability of the Time with the Clock Unit was also documented as a result of the present summative evaluation. Although some difficulty in getting teachers to return evaluation forms was encountered during this field-test (cf., Latham, 1973; McLaughlin, 1973), probably due to the fact that they were requested to fill them out within the last two weeks of the school year, responses were still good (75%). All of the responding teachers who used the Time Unit indicated that they liked it and would prefer using it to other instructional materials. Most of the teachers thought the materials offered more diversity than most other materials, and were more useable, effective and enjoyable than other commercial materials they had used before. Also, the teachers felt that the concepts covered in the Time with the Clock Unit were important and necessary in the long run.

The Time with the Clock Unit presents time skills and vocabulary which have been identified as important to the normal development of any child, especially the young EMR child (cf., Bateman, 1968; Kolstoe,

1970; Peterson, 1973). The pretest data from the present field-test and from the formative evaluation of the Time with the Clock Unit (cf., Krus, Thurlow, Howe, Taylor, and Turnure, 1974) indicated that these time concepts, while important for all children to learn, are particularly difficult for retarded children to master without instruction. The summative evaluation of the Time with the Clock Unit has demonstrated its effectiveness and useability in the classroom, and has verified the belief that the Unit fulfills an important need in the education of the young EMR child.

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## Footnotes

[1]The summative evaluation of the Time with the Clock Unit was an extensive endeavor which could not have succeeded without the help and cooperation of many individuals. Appreciation is extended to all school systems participating in the field-test, and especially to the teachers who allowed a great deal of testing and who responded willingly to all requests made of them. Special thanks are due to Joni Blumenfeld Troup, who scheduled and completed all testing, and who formed the major link between the Project and the teachers in the field-test.

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Appendix 1. Introduction to the Time with the Clock Unit

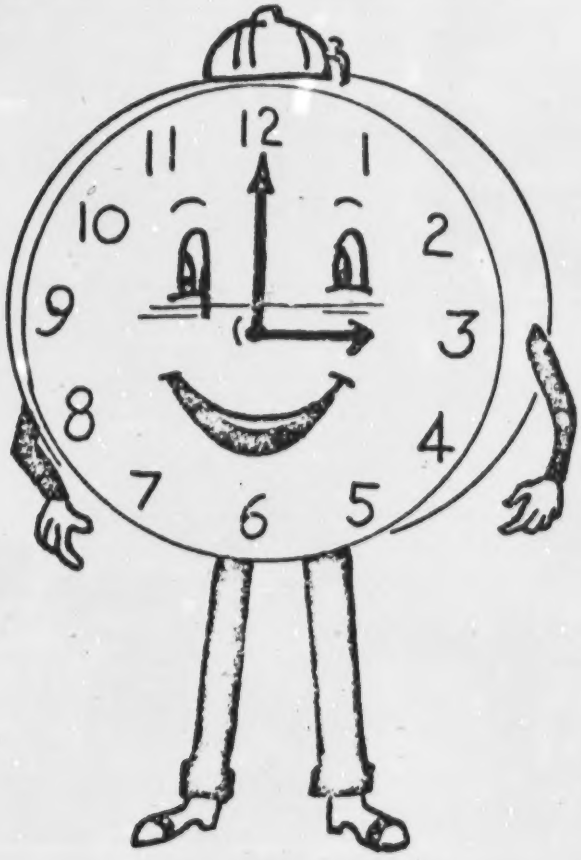
MONEY, MEASUREMENT and TIME PROGRAM

An INTRODUCTION to the

# TIME WITH THE CLOCK UNIT

by

Martha L. Thurlow and Arthur M. Taylor




DEVELOPMENTAL VERSION

This introduction to the Time with the Clock Unit should be read before any instruction in the Unit is started. The introduction presents the structure of the Unit and describes the general flow of instruction and its rationale. Careful reading of this introduction will allow you to better use the Teacher's Introduction to the Money, Measurement and Time Program and the Teacher's Editions for the Time with the Clock Unit.

# VOCABULARY DEVELOPMENT PROJECT

Project Directors:

Arthur M. Taylor, James E. Turnure,
Martha L. Thurlow, Patricia H. Krus

Research, Development and Demonstration
Center in Education of Handicapped Children
University of Minnesota
Minneapolis, Minnesota

March, 1974

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Department of Health, Education, and Welfare
U. S. Office of Education
Bureau of Education for the Handicapped

Table of Contents


| | Page |
|---|---|
| Levels of Instruction | 1 |
| Placement in the Unit | 4 |
| Books of Instruction | 5 |
| Preparing to Teach the Unit | 7 |

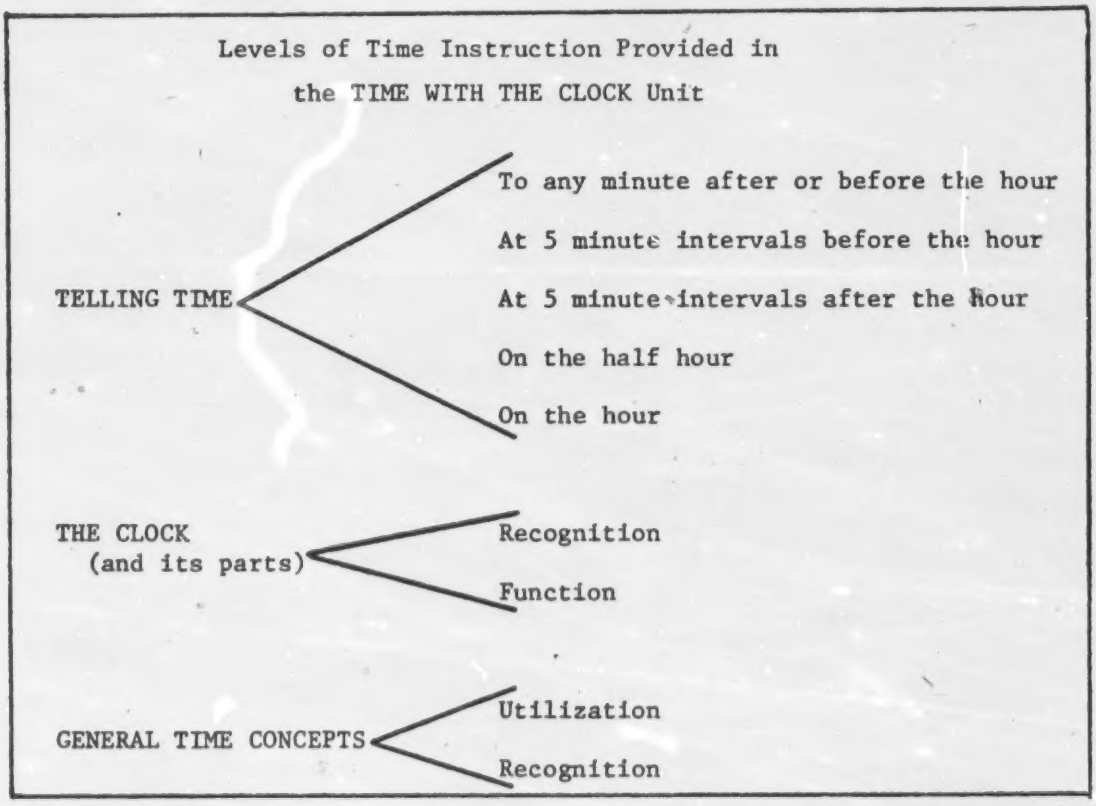
The Time with the Clock Unit is part of the Money, Measurement and Time Program. It is designed for educationally handicapped children, and therefore, makes minimal entry requirements on the children. Reading is not required in this program, nor are mathematical skills required to enter the Unit. As noted in the Overview to the Unit (found on page ii of each of the Teacher's Editions), the children are required only to have had some experience with the term "time" (such as in references like "It's time for lunch"), and a familiarity with the size concepts "big" and "little".

The instruction in the Time with the Clock Unit, like that in the other units of the Money, Measurement and Time Program, proceeds in small structured steps from vocabulary to skill development. The instruction stresses the "growth of meaning", and uses vocabulary as a vehicle for introducing skill development. In this way, the instruction represents a continuum from simple recognition, through vocabulary comprehension, and on to skill development.

Levels of Instruction

There are three basic levels of instruction in the Time with the Clock Unit. These levels are presented on the following page, with the lowest levels at the bottom of the chart and the highest levels at the top. The chart shows the progression of the Unit from the recognition and utilization of general time concepts (such as "day", "night", "morning", "afternoon", etc.) to instruction on the function and recognition of the clock and its parts. The final level of instruction involves the skills of time telling. Even within this level, however, the instruction is sequenced into smaller steps.

Thus, the child must master the skill of telling time on the hour before he proceeds to the instruction related to telling time on the half hour, and so forth.




Because it is considered so important that all children develop time telling skills, some of us may tend to begin drill on these skills before the children have mastered all the necessary prerequisite skills. Even the authors of most published math series have assumed a great deal about the child's entry skills; these assumptions are probably inappropriate for most educationally handicapped children. For example, a child should not be presented with instruction on telling time to the hour if he does not under-

stand the function of the clock in time telling. Furthermore, the child must be able to recognize the numbers 1 - 12 before he can really begin to "tell time".

As can be seen in the chart on the previous page, the Time with the Clock Unit does provide instruction at two levels which are prerequisite to time telling. If in your judgment (or because of the results of the placement test for the Time with the Clock Unit) it seems that your children need instruction at one or both of these prerequisite levels, then it is extremely important that you take the time to present this instruction before turning directly to the development of time telling skills.

The lowest level of instruction in the Time with the Clock Unit is intended to provide language-oriented instruction aimed at developing time vocabulary at beginning descriptive levels. Certainly not all children need instruction at this level, but if some of your children have difficulty understanding general time concepts (e.g., day, night, morning, afternoon, early, late) they should be given this instruction. Although the Time with the Clock Unit requires no math skills at this lowest level, instruction in the recognition of the numbers 1 - 12 should be started since this skill will be an asset for the next level of instruction (The Clock and its Parts).

The second level of instruction provides the children with additional instruction which is prerequisite to the development of time telling skills. This level is concerned with the recognition of the clock and its parts, and with the realization that a clock

shows what time it is. Specifically, the children are directed to the aspects of the clock to which they must attend in order to tell time (e.g., 12 numbers, long hand vs. short hand). It is extremely important that your children show mastery of the behavioral objectives associated with this level of instruction before they proceed to the last level (actual time telling).

The last level of instruction is that most commonly associated with "time programs". It deals with the specific skills involved in telling time. The instruction at this level is presented in small structured steps, and generally each step should be mastered before instruction proceeds to the next step. At this level of instruction, it is extremely important that the children receive adequate practice on each skill, and that instruction not proceed too rapidly. Within the Time with the Clock Unit, an evaluation activity has been included for each time telling skill. In this way, you can determine whether or not your children are ready to proceed to the next time telling skill developed in the instruction.

Placement in the Unit

Five points of entry into the instruction in the Time with the Clock Unit have been specified, and are listed below. The entry points generally correspond to the three levels of instruction in the Time With the Clock Unit, with the third level being further broken down in terms of the specific time telling skill being developed.

| Entry Points into Time with the Clock Instruction | | |
|---|---|---|
| | Placement | |
| Instruction: | Book | Lesson |
| 1. General Time Concepts | One | 1 |
| 2. The Clock | Two | 1 |
| 3. Telling Time on the Hour | Two | 3 |
| 4. Telling Time on the Half Hour | Three | 1 |
| 5. Telling Time in Minutes | Four | 1 |

Children starting the instruction at the first entry point are generally young, and have had only minimal experience with time concepts. Children starting at the second entry point have an understanding of general time concepts, and may know what a clock is and what it is used for, but generally do not have the familiarity with the clock and its parts that they will need to begin telling time. Children who enter at the third point (Book Two, Lesson 3) are ones who have mastered the necessary prerequisites and are ready to begin telling time on the hour. In a similar manner, those children entering at the fourth point can tell time on the hour, but not on the half hour; those entering at the fifth entry point can tell time on the hour and half hour, but not to the minute.

Books of Instruction

The Time with the Clock Unit has been structured into four books of instruction. The vocabulary words which form the basis of the instruction are presented below.

Vocabulary Words in Time with the Clock Unit

Book One:

light, dark
day (daytime), night (nighttime)
today, tonight
morning, afternoon
early, on time, late

Book Two:

clock, face, hands
long hand, short hand
o'clock
hour

Book Three:

thirty
half hour (half past)
hour, half hour
(second, second hand)

Book Four:

minute
minutes
minute hand, hour hand
minutes after (quarter after)
minutes before (quarter to)

Book One corresponds to the first level of instruction discussed previously. It presents several general time concepts which do not require the use of the clock, but which are ones the child should be familiar with before proceeding to instruction related to the clock. The first half of Book Two deals with the second level of instruction, presenting the clock, its function, and the parts of the clock to which the child must attend in order to tell time. The last half of Book Two initiates instruction at the final level (telling time) by teaching the children how to tell time on the hour (using the word o'clock) and showing them the passage of one hour on a clock. Book Three and Book Four present the remainder of instruction in the final level. Book Three deals with telling time on the half hour on the clock. Book Four presents instruction on more complex time telling (i.e., telling time in minutes). Within Book Four, instruction is sequenced so the child first learns to count minutes

by fives, then to tell time in minutes after the hour, and finally to tell time in minutes before the hour. More complete descriptions of the books in the Time with the Clock Unit may be found in each Teacher's Edition on pages ii and iii (also see the related section in each Teacher's Edition entitled "Getting Started in Book....")

Preparing to Teach the Unit

The Teacher's Editions contain all the instruction encompassed in the Time with the Clock Unit, and each one should be your "right hand" as you teach the Unit. In order to use the Teacher's Editions most effectively, you should be familiar with the structure of the Editions, and with the format and instructional techniques underlying the lessons in the Unit. Complete descriptions of these aspects of the instruction may be found in the Teacher's Introduction to the Money, Measurement and Time Program. It is suggested that after reading this introduction to the Time with the Clock Unit, the next step in preparing to teach the Unit should be to read the Teacher's Introduction to the Money, Measurement and Time Program.

All materials needed to teach the Time with the Clock Unit will be supplied, except for the clocks and the tape player. It is suggested that you have at least one large clock with moveable hands, a classroom clock and at various times, other "real" clocks for the children to investigate (starting with the instruction in Book Two). The basic materials supplied are student texts, audio tape cassettes, worksheets, transparencies, and materials for the Introductory Lesson. There are two types of student texts, which

are used during the tape presentation: Big Picture Books are used for Books One and Two, and individual Children's Picture Books are used for Books Three and Four. The basic types of materials used in the Money, Measurement and Time Program are more fully described in the Teacher's Introduction.

Before beginning instruction in the Time with the Clock Unit, it is extremely important that you be familiar with the suggested procedures for using the materials in the Money, Measurement and Time Program, as well as with the content of the Time with the Clock Unit itself. It is again strongly suggested that you read the Teacher's Introduction to the Money, Measurement and Time Program, especially the last section which deals with the use of the materials in the classroom. Second, it is suggested that you familiarize yourself with the purpose of each book and then with the structure of the instruction (by paging through several lessons). When you feel confident about your understanding of the Unit, you should begin the instruction. In every case, this will mean presenting the Introductory Lesson, which famiarizes the children with Mr. Time (the character who will introduce all tape presentations) and with the format of the tape presentations and the responses required of the children. Then, as you proceed to teach each lesson, you should prepare for each lesson by reading through the complete lesson before beginning any step of the instruction.

We feel that the Time with the Clock Unit will be a rewarding learning experience for the children and an enjoyable teaching experience for you. Your understanding of the Unit, and your preparation

for the instruction will certainly increase the effectiveness of the Unit.

Appendix 2. Teacher Evaluation Form

TIME WITH THE CLOCK

Unit Evaluation

1. Where did you start teaching in the Time Unit? Book_____ Lesson_____

2. Where did you stop teaching in the Time Unit? Book_____ Lesson_____

3. Please indicate:
   a. The average preparation time for each teaching period: _____ minutes
   b. The average length of each teaching period: _____ minutes
   c. The average number of teaching periods per five day week: _____

4. Please indicate the percentage of time in which instruction was given to:

   Whole class_____%
   Small groups_____%
   Individuals_____%

---

1. How did you feel about using the Time Unit?
   _____ I enjoyed it very much
   _____ I thought it was alright
   _____ I would rather use something else next time

2. Have you used any other commercial materials or math texts to teach time concepts? _____ YES _____ NO
   If YES, what did you use?

   a. If given a choice of materials to use to teach time:
      _____ I would prefer to use this Time Unit rather than others
      _____ I would use either this Time Unit or other time materials; wouldn't matter
      _____ I would prefer to supplement this Time Unit with other materials
      _____ I would prefer to use other materials all together

   b. Compared to other commercial materials, was the Time Unit
      More useable? _____ YES _____ NO
      More effective? _____ YES _____ NO
      More enjoyable? _____ YES _____ NO

3. Did you get tired of teaching with these materials?
   _____ Yes, the repetiveness was boring
   _____ Sometimes, but the repetiveness is necessary to teach my students
   _____ No, these materials offer more diversity than most

4. How important do you think the concepts covered in the Time Unit are to the children in the long run?

_____ All concepts are essential
_____ Most concepts are necessary
_____ Concepts are good, but not necessary
_____ Most concepts are not needed

5. Do you think the children will remember the more important time concepts a year from now? _____ YES _____ NO

6. How effective were the materials:

_____ Very effective
_____ Effective
_____ Could have been more effective
_____ Not very effective at all

7. How interested were the children in the Time instruction?

_____ More interested than usual
_____ About as interested as in other instruction
_____ Not very interested

---

Please rate the following aspects of the Time Unit in terms of their appropriateness (or, completeness), for you as the teacher. Rate each item from 1 to 5, with 1 being the least appropriate (or, complete) and 5 being the most appropriate (or, complete).

| | Appropriateness | Completeness |
|---|---|---|
| a. Inservice training | | |
| b. Teacher's Editions, in general | | |
| c. Introductory pages to Teacher's Editions | | |
| d. Directions to teacher in lessons | | |
| e. Pre-activities | | |
| f. Lesson Organizers | | |
| g. Scripts accompanying tape presentations | | |
| h. Post-activities | | |
| i. Worksheets | | |
| j. Transparencies | | |

Please rate the following aspects of the Time Unit in terms of their effectiveness, enjoyability, interest, and attention-focusing ability, for the children in your classroom. Rate each item from 1 to 5, with 1 being the least effective (enjoyable, interesting, or attention-focusing) and 5 being the most effective (enjoyable, interesting, or attention-focusing).

| | Effectiveness | Enjoyability | Interest | Attention-focusing |
|---|---|---|---|---|
| a. Introductory lesson (for preparation) | | | | |
| b. Mr. Time | | | | |
| c. Pre-activities | | | | |
| d. Tape recordings | | | | |
| e. Worksheets | | | | |
| f. Transparencies | | | | |
| g. Art work in books, worksheets, etc. | | | | |
| h. Post-activities for review | | | | |
| i. Post-activities to expand concepts | | | | |
| j. Post-activities to build skills | | | | |

1. Did you have any problems with the pre-testing and/or post-testing of the unit? _____ YES _____ NO
   If YES, what were the problems?

2. Where did the pre-test results suggest that you start teaching the Time Unit? Book_____ Lesson_____

3. Did you agree with the recommended starting point? _____ YES _____ NO

4. Did you teach all the lessons between the points at which you started and stopped instruction? _____ YES _____ NO
   If NO, what did you skip?

5. At what mental age would you recommend that children could start in the Time Unit? _____

6. Are there any children for whom you feel the Time Unit is not appropriate?

7. How long do you think it would take your children to complete the entire Time Unit?

8. How long do you think it would take your children to cover the same content as presented in the Time Unit, without the use of the program?

9. Which of the following teacher-administered assessment devices would you like to see added to the Teacher's Editions to evaluate the children's progress?

_____ Lesson tests
_____ Book tests
_____ Unit tests
_____ None

---

1. Look at the sequence of the entire Time Unit. Is there any way you would change the sequence? _____ YES _____ NO
If YES, how?

2. How do you feel about the completeness of the Time Unit?

_____ Needs more instruction at the beginning
_____ Needs more instruction at the end
_____ Unit is complete as it is

---

Frequently, when a new program of instruction is introduced into a classroom, other individuals see and react to the materials. Please rate the reactions of any of the following individuals to the Time materials, on a scale of 1 to 5 (1 = negative reaction; 5 = positive reaction).

_____ Principal
_____ Parents
_____ Regular classroom teachers
_____ Aides
_____ Others

---

Please indicate:

a. Number of years of teaching experience (include all teaching except student teaching) _____
b. Number of years teaching educationally handicapped children _____
c. Are you certified in special education? ____ YES ____ NO

---

If you have the time and the inclination, are there any suggestions about the testing or the materials you would like to share with us?

Is there anything else you would like to tell us?

And, a FEW more general questions . . . . .

These questions have "popped up as a result of some comments we have received. Please let us know how you feel.

Do you think the Money, Measurement and Time Program should be modified into a program of individualized instruction?

1. Did you like using the Big Picture Book? _____ Please note any suggestions you have for making the Big Picture Book more useable and/or more effective.

2. Did you like the children to have their own texts? _____ Please note any suggestions you have for making the Children's Picture Books more useable and/or more effective.

3. How do you think the student texts should be supplied to the classroom?
   - _____ Only in the form of Big Picture Books
   - _____ Only in the form of individual Children's Picture Books.
   - _____ In both forms, with both being used during the same tape presentation
   - _____ In both forms, with the teacher selecting the form to be used during a given tape presentation
   - _____ In one form for certain books and the other form for other books (i.e., as it is now)

4. What do you think would be the most effective and useful way to inform the teacher of the content of the tape presentations?
   - _____ Complete script (i.e., as is)
   - _____ Summary of script
   - _____ No script at all

Please describe the room arrangement you used during the tape presentations (e.g., children on floor around tape player, children at desks with tape player in front of room, etc.). Draw a diagram if this will clarify your response.

Is there any other room arrangement you think would be best for optimizing the effectiveness of the tape presentations?

---

What do you feel would be the best way to introduce a unit in the Money, Measurement and Time Program to a teacher planning to use it in the classroom?

_____ Inservice training session
_____ Written document describing unit flow, books, etc.
_____ Both inservice training and written document

The Teacher's Introduction to the Money, Measurement and Time Program was designed to familiarize the teacher with the total program. Please briefly describe your reactions to the Teacher's Introduction and any recommendations you have for improving it.

Appendix 3. Teacher Evaluations of the Time with the Clock Unit

A. Teacher Characteristics

1. Number of years of teaching experience (all teaching except student teaching):
   $\bar{X}$ = 6.9 years
   SD = 6.2
   Range: 0-18

2. Number of years teaching educationally handicapped children:
   $\bar{X}$ = 6.1 years
   SD = 6.3
   Range: 0-18

3. Five teachers were certified and one was a student teacher.

B. Teaching Characteristics

1. Average preparation time for each teaching period:
   $\bar{X}$ = 18.3 minutes
   SD = 9.8
   Range: 10-30 minutes

2. Average length of each teaching period:
   $\bar{X}$ = 25.0 minutes
   SD = 17.32
   Range: 20-45 minutes

3. Average number of teaching periods per five day week:
   $\bar{X}$ = 5.0
   SD = 0
   Range: all 5 days

4. Room arrangement (asked of only 4 teachers):
   a. I have a small group and could set the children around a large table with the tape player at one end.

   b.

   tape player

   x - teacher

   x x x x x x x - children on cubes

   c.

   x tape

   x x x x x x x - children

   d. Children at desks in a semicircle

   x

   x x x x x

e. Children at desks or a round table with tape recorder

NOTE: One teacher said she liked her group centering around the tape. She said it helped to unify concentration on the material being presented. Another suggested sitting at desks with individual books to optimize the effectiveness of the instruction.

f. The children sat on the floor around the tape recorder in a big C.

x - recorder

x x - children
x x x

C. General Reactions to the Time with the Clock Unit

1. Item: "How did you feel about using the Time with the Clock Unit?"

70% "I enjoyed it very much"
30% "I thought it was all right"
0% "I would rather use something else next time"

2. Item: "Did you get tired of teaching with these materials?"

0% "Yes, the repetiveness was boring"
50% "Sometimes, but the repetiveness is necessary to teach my students"
50% "No, these materials offer more diversity than most"

3. Item: "How important do you think the concepts covered in the Time with the Clock Unit are to the children in the long run?"

70% "All concepts are essential"
30% "Most concepts are necessary"
0% "Concepts are good, but not necessary"
0% "Most concepts are not needed"

4. Item: "Do you think the children will remember the more important time concepts a year from now?"

100% Yes 0% No

5. Item: "How effective were the materials?"

70% "Very effective"
30% "Effective"
0% "Could have been more effective"
0% "Not very effective at all"

6. Item: "How interested were the children in the Time with the Clock instruction?"

100% "More interested than usual"
0% "About as interested as in other instruction"
0% "Not very interested"

Comments:

"To begin, near the end of the year it lost something, but I think it was the end of the year."

"They actually looked forward to the time set aside for the Unit."

D. Answers to Specific Questions

1. When asked to name other materials the teachers had used to teach time, the following were noted:

Houghton Mifflin
Math Texts
Two teachers noted they did use other materials, but mentioned no names.
One teacher said she did use other materials.

When asked if given a choice of materials to use to teach Time with the Clock, the following reactions were given. (based on 5 teachers)

100% "I would prefer to use this Time with the Clock Unit rather than others"
0% "I would use this Time with the Clock Unit or other time materials; wouldn't matter"
0% "I would prefer to Supplement this Time with the Clock Unit with other materials"
0% "I would prefer to use other materials all together"

When asked to compare the Time with the Clock Unit to other commerical materials they had used, the Time with the Clock Unit was rated as: (based on 5 teachers)

| | | | | |
|---|---|---|---|---|
| More usable? | 100% | Yes | 0% | No |
| More effective? | 100% | Yes | 0% | No |
| More enjoyable? | 100% | Yes | 0% | No |

2. Item: "At what mental age would you recommend that children could start in the Time with the Clock Unit?"

(5 responses)

$\overline{X}$ = 5.4
SD = 1.5
Range = 3.5-7.6

3. Item: "Look at the sequence of the entire Time with the Clock Unit. Is there any way you would change the sequence?"

0% Yes 100% No

4. Item: "How do you feel about the completeness of the Time with the Clock Unit?" (5 responses)

0% "Needs more instruction at the beginning"
20% "Needs more instruction at the end"
80% "Unit is complete as it is"

NOTE: One teacher indicated she did not complete the unit.

5. When asked to rate the reactions of other individuals to the Time with the Clock materials, the following were given: (Rating is one scale of 1 to 5 from most negative reaction to most positive)

5 Principal (n=2)
4.8 Parents (n=5)
4.7 Regular classroom teachers (n=6)
5.0 Aides (n=3)
5.0 Others (n=2)

6. Item: "Which of the following teacher-administered devices would you like to see added to the Teacher's Editions to evaluate the children's progress?"

100% Lesson tests (n=1)
100% Book tests (n=4)
100% Unit tests (n=4)
0% None

NOTE: One teacher said the "Book Tests" should be administered orally to individuals.

7. Item: "Are there any children for whom you feel the Time with the Clock Unit is not appropriate?"

Responses:

a. "Book 4 a little too difficult for trainable level and even the lower educable."
b. "Children over 9 years old-- sometimes some parts of the unit were too young for my group (7-10 years old."
c. "I believe Book I is appropriate for all children. Books II & III are appropriate for MA's of 7.6 - 9. After MA 9 - Book IV."
d. No
e. Two teachers did not respond.

8. Item: (a) "How long do you think it would take your children to complete the entire Time with the Clock Unit?"
(b) "How long do you think it would take your children to cover the same content as presented in the Time with the Clock Unit, without the use of the program?"

| (a) | (b) |
|---|---|
| "I was unable to complete Book IV. I stopped after Lesson 3, rest is difficult for my children." | NR |
| 3-4 months | about the same |
| 4 months | NR |
| 5 months | a lot longer |
| varies, about 2-3 months | NR |
| "The children in my class could not complete the entire time unit. Their ability is low and they could not go beyond Book 2." | "I would not attempt to teach a unit on time." |

E. Teacher Reactions to Specific Aspects of the Time with the Clock Unit. (mean rating on scale of 1 to 5, from negative to positive; the number in parentheses is the n)

| | Appropriateness | Completeness | Average |
|---|---|---|---|
| 1. In-service training | 3.0 (3) | 3.0 (3) | 2.5 (4) |
| 2. Teachers Editions, general | 4.8 (6) | 4.8 (6) | 4.0 (6) |
| 3. Introductory Pages | 4.8 (5) | 4.8 (6) | 4.2 (6) |
| 4. Directions to teachers in lessons | 5.0 (5) | 5.0 (6) | 4.6 (6) |
| 5. Pre-Activities | 5.0 (6) | 5.0 (5) | 4.6 (6) |
| 6. Lesson Organizers | 4.8 (5) | 4.8 (6) | 4.6 (6) |
| 7. Scripts for tapes | 4.8 (5) | 4.5 (6) | 4.4 (6) |
| 8. Post-Activities | 4.5 (6) | 4.8 (5) | 4.2 (6) |
| 9. Worksheets | 4.3 (6) | 4.6 (5) | 4.1 (6) |
| 10. Transparencies | 4.6 (3) | 4.6 (3) | 4.7 (3) |

F. Children Reactions to Specific Aspects of the Time with the Clock Unit (mean rating by teacher on a scale of 1 to 5, from positive to negative; the number in parentheses is the n)

| | Effectiveness | Enjoyability | Interest | Attention Focusing | Average |
|---|---|---|---|---|---|
| 1. Introductory | 4.7 (5) | 4.8 (6) | 4.6 (5) | 4.8 (5) | 4.7 (5) |
| 2. Mr. Time | 5.0 (5) | 5.0 (6) | 5.0 (5) | 5.0 (5) | 5.0 (5) |
| 3. Pre-Activities | 4.8 (6) | 4.8 (6) | 4.8 (6) | 4.8 (6) | 4.8 (5) |
| 4. Tapes | 4.8 (5) | 4.8 (5) | 4.8 (5) | 4.8 (5) | 4.8 (5) |
| 5. Worksheets | 4.4 (5) | 4.2 (5) | 4.2 (5) | 4.2 (5) | 4.3 (5) |
| 6. Transparencies | 5 (2) | 5 (2) | 5 (2) | 5 (2) | 5.0 (2) |
| 7. Art Work | 4.8 (4) | 4.8 (4) | 4.8 (4) | 4.8 (4) | 4.8 (4) |
| 8. Post Acts: Review | 4.4 (5) | 4.2 (5) | 4.2 (5) | 4.4 (5) | 4.5 (5) |
| 9. Post Acts: Expand | 4.2 (5) | 4.0 (5) | 4.0 (5) | 4.2 (5) | 4.1 (5) |
| 10. Post Acts: Skills | 4.4 (5) | 4.2 (5) | 4.2 (5) | 4.4 (5) | 4.3 (5) |

G. Specific Questions about Materials in general (based on 5 responses).

1. Item: "Did you like using the Big Picture Book?"

80% Yes 0% No 20% ok

Specific Comments:

a. "I believe the individual books are more effective."
b. "Make a little larger, more colorful."
c. "If possible, make the big book a small one."
d. "I didn't use it that much. It would be nice to have it colored."

"Did you like the children to have their own texts?" (5 responses)

80% Yes 20% No

Specific Comments:

a. "I think they were effective, children enjoyed having own texts."
b. "My group didn't attend as well when they had their own books as when we used the Big Picture Book."
c. "If possible, colored pictures would be more effective."

2. Item: "How do you think the student texts should be supplied to the classroom?"

| | |
|---|---|
| 0% | "Only in the form of Big Picture Books " |
| 33% | "Only in the form of individual Children's Picture Books" |
| 33% | "In both forms, with both being used during the same tape presentation" |
| 17% | "In both forms, with the teacher selecting the form to be used during a given tape presentation" |
| 17% | "In one form for certain books and the other form for the other books (i.e., as it is now)" |

3. Item: "What do you think would be the most effective and useful way to inform the teacher of the content of the tape presentations?"

| | |
|---|---|
| 100% | Complete script (as it is) |
| 0% | Summary of script |
| 0% | No script at all |

4. Item: "Do you think the Money, Measurement and Time Program should be modified into a program of individualized instruction?"

a. "No, I feel group instruction is effective, stimulating the child to listen and learn more effectively. They like group learning."
b. "No!"
c. "Yes, I noticed a large variance in my group as far as the rate they mastered the material."
d. "No, I felt a small group situation worked best."
e. "I think it would be an extremely worthwhile modification for those who can't adjust in a group situation."

5. Item: "What do you feel would be the best way to introduce a unit in the Money, Measurement and Time Program to a teacher planning to use it in the classroom?"

| | |
|---|---|
| 33% | In-service training |
| 17% | Written document describing unit flow, books, etc. |
| 50% | Both in-service training and written document |

H. Reactions to the "Teacher's Introduction"

a. "The Teacher's Introduction describes the set-up of the program and anticipated goals effectively. I must admit I really didn't digest it fully until after I started work in the respective units."
b. "None!"

c. "I felt the Teacher's Introduction served the purpose it was suppose to. What would have been useful -- more inservice training. At least one more when a new unit was to be presented."

I. Teacher Comments (ones not specifically elicited by questionnaire)

a. "I believe lesson or at least unit tests would be helpful. Waiting until the end of the entire program for testing is too long. Tests spot weaknesses which can be corrected before unit is complete."
b. "The materials were very easy to use and the children were enthusiastic to use them. My overall opinion of the money and time units I taught were excellent. The children actually looked forward to the time set aside for the unit. I plan to continue these units next year."
c. "I thoroughly enjoyed it."
d. "I would like to see the test materials and have them explained so I know exactly what they learned and where the weak areas are for each child."

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University of Minnesota Research, Development and Demonstration
Center in Education of Handicapped Children

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